

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

|   |   |  |
|---|---|--|
| Applicant's or agent's file reference<br><b>Case 0145</b> | <b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below. |  |
| International application No.<br><b>PCT/SE 99/ 01113</b>  | International filing date (day/month/year)<br><b>18/06/1999</b>   | (Earliest) Priority Date (day/month/year)<br><b>24/06/1998</b> |
| Applicant<br><b>AKZO NOBEL N.V.</b>                       |   |  |

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

## 1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :



contained in the international application in written form.



filed together with the international application in computer readable form.



furnished subsequently to this Authority in written form.



furnished subsequently to this Authority in computer readable form.



the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.



the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

**IONIC POLYURETHANES**

5. With regard to the **abstract**,



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The full text of the international application is to be published, with the abstract in English.

## INTERNATIONAL SEARCH REPORT

International Application No

/SE 99/01113

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 C08G18/08 C08G18/66 C08G18/80 D21H17/57

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 C08G D21H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category ° | Citation of document, with indication, where appropriate, of the relevant passages  | Relevant to claim No. |
|------------|---|-----------------------|
| Y          | EP 0 268 806 A (AKZO NV)<br>1 June 1988 (1988-06-01)<br>page 3, line 6 -page 3, line 36<br>example 3<br>claim 2<br>& US 4 777 224 A | 1-15                  |
| Y          | WO 96 40811 A (FULLER H B LICENSING<br>FINANC) 19 December 1996 (1996-12-19)<br>page 4, line 31 -page 6, line 30<br>claims 1-3      | 1-15                  |
| Y          | US 4 096 127 A (SCHURMANN HORST ET AL)<br>20 June 1978 (1978-06-20)<br>cited in the application<br>claim 2; example 6               | 1-15                  |
|            | ---<br>-/--   |                       |

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## ° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&amp;" document member of the same patent family

Date of the actual completion of the international search

15 October 1999

Date of mailing of the international search report

27/10/1999

Name and mailing address of the ISA

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NL - 2280 HV Rijswijk  
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Fax: (+31-70) 340-3016

Authorized officer

Heidenhain, R

# INTERNATIONAL SEARCH REPORT

International Application No

/SE 99/01113

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category ° | Citation of document, with indication, where appropriate, of the relevant passages   | Relevant to claim No. |
|------------|--|-----------------------|
| A          | <p>WO 96 38629 A (BAYER AG ; JANSEN BERNHARD (DE); KOENIG JOACHIM (DE); NOWAK PETER ( )<br/>                     5 December 1996 (1996-12-05)<br/>                     -----</p> | 1-15                  |

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

/SE 99/01113

| Patent document<br>cited in search report |   | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|---|---|---------------------|----------------------------|---------------------|
| EP 0268806                                | A | 01-06-1988          | DE 3640752 A               | 09-06-1988          |
|   |   |                     | FI 874434 A                | 29-05-1988          |
|   |   |                     | JP 63137918 A              | 09-06-1988          |
|   |   |                     | US 4777224 A               | 11-10-1988          |
| -----                                     |   |                     |                            |                     |
| WO 9640811                                | A | 19-12-1996          | US 5610232 A               | 11-03-1997          |
|   |   |                     | US 5872182 A               | 16-02-1999          |
|   |   |                     | AU 695629 B                | 20-08-1998          |
|   |   |                     | AU 6102796 A               | 30-12-1996          |
|   |   |                     | CA 2219378 A               | 19-12-1996          |
|   |   |                     | EP 0830402 A               | 25-03-1998          |
|   |   |                     | JP 11507675 T              | 06-07-1999          |
|   |   |                     | NZ 310261 A                | 29-04-1999          |
|   |   |                     | AU 6101696 A               | 11-06-1997          |
|   |   |                     | CA 2233083 A               | 29-05-1997          |
|   |   |                     | EP 0847409 A               | 17-06-1998          |
|   |   |                     | WO 9719121 A               | 29-05-1997          |
| -----                                     |   |                     |                            |                     |
| US 4096127                                | A | 20-06-1978          | DE 2457972 A               | 16-06-1976          |
|   |   |                     | AR 208936 A                | 15-03-1977          |
|   |   |                     | AT 356510 B                | 12-05-1980          |
|   |   |                     | AT 611077 A                | 15-09-1979          |
|   |   |                     | AT 343915 B                | 26-06-1978          |
|   |   |                     | AT 911175 A                | 15-10-1977          |
|   |   |                     | AU 8681075 A               | 26-05-1977          |
|   |   |                     | BE 836210 A                | 01-04-1976          |
|   |   |                     | BR 7508038 A               | 24-08-1976          |
|   |   |                     | CA 1068440 A               | 18-12-1979          |
|   |   |                     | CH 622535 A                | 15-04-1981          |
|   |   |                     | CS 198254 B                | 30-05-1980          |
|   |   |                     | DD 128378 A                | 16-11-1977          |
|   |   |                     | ES 442993 A                | 01-07-1977          |
|   |   |                     | FI 753272 A, B,            | 08-06-1976          |
|   |   |                     | FR 2293449 A               | 02-07-1976          |
|   |   |                     | GB 1516340 A               | 05-07-1978          |
|   |   |                     | IE 42099 B                 | 04-06-1980          |
|   |   |                     | IT 1052461 B               | 20-06-1981          |
|   |   |                     | JP 1048824 C               | 28-05-1981          |
|   |   |                     | JP 51088598 A              | 03-08-1976          |
|   |   |                     | JP 55041607 B              | 25-10-1980          |
|   |   |                     | NL 7514248 A, B,           | 09-06-1976          |
|   |   |                     | SE 425397 B                | 27-09-1982          |
|   |   |                     | SE 7513727 A               | 08-06-1976          |
|   |   |                     | YU 308275 A                | 27-04-1983          |
|   |   |                     | ZA 7507197 A               | 27-10-1976          |
| -----                                     |   |                     |                            |                     |
| WO 9638629                                | A | 05-12-1996          | DE 19520092 A              | 05-12-1996          |
|   |   |                     | AU 698702 B                | 05-11-1998          |
|   |   |                     | AU 5998796 A               | 18-12-1996          |
|   |   |                     | CA 2222731 A               | 05-12-1996          |
|   |   |                     | DE 59602726 D              | 16-09-1999          |
|   |   |                     | EP 0828890 A               | 18-03-1998          |
|   |   |                     | JP 11505899 T              | 25-05-1999          |
|   |   |                     | ZA 26044731 A              | 11-12-1996          |

# PATENT COOPERATION TREATY

RECEIVED

From the  
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

2000-09-21

PCT

Eka Chemicals AB  
Patent Department

To:

NYANDER, Johan  
Eka Chemicals AB  
Patent Department  
Box 11556  
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SUEDE

NOTIFICATION OF TRANSMITTAL OF  
THE INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT  
(PCT Rule 71.1)

Date of mailing  
(day/month/year) 19. 09. 00

Applicant's or agent's file reference  
Case 0145

IMPORTANT NOTIFICATION

International application No.  
PCT/SE99/01113

International filing date (day/month/year)  
18/06/1999

Priority date (day/month/year)  
24/06/1998

Applicant  
AKZO NOBEL N.V. et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/



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D-80298 Munich

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Authorized officer

Hardy Magliano, N



# ATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

|  |   |   |
|--|---|---|
| Applicant's or agent's file reference<br><b>Case 0145</b>  | <b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) |   |
| International application No.<br><b>PCT/SE99/01113</b>   | International filing date (day/month/year)<br><b>18/06/1999</b>   | Priority date (day/month/year)<br><b>24/06/1998</b> |
| International Patent Classification (IPC) or national classification and IPC<br><b>C08G18/08</b> |   |   |
| Applicant<br><b>AKZO NOBEL N.V. et al.</b>   |   |   |

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

|  |  |
|--|--|
| Date of submission of the demand<br><b>17/01/2000</b>  | Date of completion of this report<br><b>19.09.00</b> |
| Name and mailing address of the international preliminary examining authority:<br><b>European Patent Office<br/>D-80298 Munich</b> | Authorized officer<br><b>Heidenhain, R</b>           |



# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/SE99/011113

## I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

### Description, pages:

1-13 as originally filed

### Claims, No.:

1-16 as received on 24/06/2000 with letter of 15/06/2000

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:  
☐ the claims, Nos.:  
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

### 1. Statement

|                               |      |             |
|-------------------------------|------|-------------|
| Novelty (N)                   | Yes: | Claims 1-16 |
|                               | No:  | Claims      |
| Inventive step (IS)           | Yes: | Claims 1-16 |
|                               | No:  | Claims      |
| Industrial applicability (IA) | Yes: | Claims 1-16 |
|                               | No:  | Claims      |

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/SE99/01113

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**2. Citations and explanations**

**see separate sheet**



**Re Item V**

**Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

Novelty: Claims are novel over D1 in that the second alcohol ii) has been restricted to diols having not more than 8C-atoms or polyols with at least three hydroxyl groups. In D1 the second polyol is a polyoxyalkylene diol of molecular weight about 2000 (Article 33, 2 PCT).

Inventive step: D1 (or its American equivalent US4777224, which is cited in the application) is considered to be closest prior art. It differs over the application in the component ii), see above under novelty.

Object of the application is to provide paper sizing agents based on charged polyurethanes with improved sizing, stability and application properties.

From table 1 in the application, the polyurethane dispersions of the examples according to the invention showed significant improved sizing efficiency over the dispersion of the comparative example 10, where a charged polyurethane was prepared according to the teachings of D1 adding a polyethylene glycol of average molecular weight 2000. This is regarded as indicative of the solution of the technical problem by the distinguishing feature over the closest prior art. The solution is not obvious in view of any other known art. Therefore an inventive step is acknowledged (Article 33 3 PCT).

ART 34 AMDT

15

Claims

1. A process for the production of charged polyurethanes comprising reacting isocyanate groups of a polyisocyanate with hydroxyl groups of different alcohols comprising  
(i) a first alcohol selected from one or more diols containing at least 10 carbon atoms;  
5 (ii) a second alcohol selected from alkylene diols having not more than 8 carbon atoms, alkyleneoxy diols having not more than 8 carbon atoms, polyols with at least three hydroxyl groups, and mixtures thereof;  
(iii) a third alcohol selected from (a) diols containing a charged group or atom, (b) diols containing an uncharged group or atom capable of charge formation and at least partially  
10 converting the uncharged group or atom into a charged group or atom, (c) polyols and further reaction of one or more hydroxyl group derived from the polyol with a compound containing a charged group or atom or a compound containing an uncharged group or atom capable of charge formation and at least partially converting said uncharged group or atom into a charged group or atom, and mixtures thereof.
- 15 2. A process for the production of charged polyurethanes according to claim 1, characterised in that the second alcohol is selected from polyols containing from 3 to 10 carbon atoms.
3. A process for the production of charged polyurethanes according to claim 1 or 2, characterised in that in the production of anionic polyurethanes, the first  
20 alcohol is an aliphatic diol having an aliphatic side-chain substituent having at least 10 carbon atoms.
4. A process for the production of charged polyurethanes according to claim 1, 2 or 3, characterised in that the polyurethane is anionic.
5. A process for the production of charged polyurethanes according to claim 1, 2  
25 or 3, characterised in that the polyurethane is cationic.
6. A process for the production of charged polyurethanes according to claim 1, 2 or 3, characterised in that the polyurethane is amphoteric.
7. A process according to any of the preceding claims, characterised in that the third alcohol is selected from (a) diols containing a charged group or atom, (b)  
30 diols containing an uncharged group or atom capable of charge formation, and mixtures thereof.
8. A process according to any of the preceding claims, characterised in that the first and second alcohols are introduced into the process for reaction before introducing the third alcohol.
- 35 9. A process according to any of the preceding claims, characterised in that (i) the first alcohol is an aliphatic diol having an aliphatic substituent with at least 10

carbon atoms; (ii) the second alcohol is selected from diols, triols, tetraols, and mixtures thereof; and (ii) the third alcohol is selected from N-alkandiol dialkylamines, acid addition salts thereof and quaternization products thereof, N-alkyl dialkanolamines, acid addition salts thereof and quaternization products thereof, diols containing a carboxylic acid group, diols containing a carboxylate group, diols containing a sulfonic acid group, diols containing a sulfonate group, and mixtures thereof.

10. A process according to any of the preceding claims, characterised in that the process is carried out using from 10 to 60 mole% of (I) hydroxyl groups of the first alcohol, from 3 to 50 mole% of (II) hydroxyl groups of the second alcohol and from 25 to 60 mole% of (III) hydroxyl groups of the third alcohol, the sum of percentages of (I) + (II) + (III) being 100.

11. Charged polyurethane obtainable by a process according to any one of claims 1 to 10.

12. Aqueous dispersion containing a charged polyurethane according to claim 11 or containing a charged polyurethane produced according to any of claims 1 to 10.

13. A method of surface-treating a material in sheet or web form by applying a composition to the surface of the material, characterised in that the composition comprises a charged polyurethane according to claim 11 or an aqueous dispersion containing a charged polyurethane according to claim 12.

14. A method according to claim 13, characterised in that the material in sheet or web form is a cellulosic product.

15. A method according to claim 13 or 14, characterised in that it is a surface sizing method which is carried out using an aqueous sizing composition.

16. A method according to claim 13 or 14, characterised in that it is a paper coating method which is carried out using an aqueous pigmented composition.

**PCT**WORLD INTELLECTUAL PROPERTY ORGANIZATION  
International Bureau

## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

|   |           |  |
|---|-----------|--|
| <b>(51) International Patent Classification <sup>6</sup> :</b><br><b>C08G 18/08, 18/66, 18/80, D21H 17/57</b>   | <b>A1</b> | <b>(11) International Publication Number:</b> <b>WO 99/67310</b><br><b>(43) International Publication Date:</b> 29 December 1999 (29.12.99)  |
| <b>(21) International Application Number:</b> PCT/SE99/01113<br><b>(22) International Filing Date:</b> 18 June 1999 (18.06.99)<br><b>(30) Priority Data:</b><br>60/090,507 24 June 1998 (24.06.98) US<br>98850112.8 24 June 1998 (24.06.98) EP<br><b>(71) Applicant (for all designated States except US):</b> AKZO NOBEL N.V. [NL/NL]; P.O. Box 9300, NL-6800 SB Arnhem (NL).<br><b>(71) Applicant (for SE only):</b> EKA CHEMICALS AB [SE/SE]; S-445 80 Bohus (SE).<br><b>(72) Inventors; and</b><br><b>(75) Inventors/Applicants (for US only):</b> BIERMANN, Christian [DE/DE]; Konenstrasse 12, D-52349 Düren (DE). MACHEREY, Heribert [DE/DE]; Altenweiher 15, D-52372 Kreuzau (DE). GORZYNSKI, Marek [DE/DE]; Am Courtenbachshof 3, D-52349 Düren (DE).<br><b>(74) Agent:</b> NYANDER, Johan; Eka Chemicals AB, Patent Dept., P.O. Box 11556, S-100 61 Stockholm (SE).   |           | <b>(81) Designated States:</b> AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).<br><br><b>Published</b><br><i>With international search report.</i><br><i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> |
| <b>(54) Title:</b> IONIC POLYURETHANES<br><br><b>(57) Abstract</b><br><br>The invention relates to a process for the production of charged polyurethanes comprising reacting isocyanate groups of a polyisocyanate with hydroxyl groups of alcohols comprising (i) a first alcohol selected from one or more diols containing at least 10 carbons atoms; (ii) a second alcohol selected from alkylene diols having not more than 8 carbon atoms, alkyleneoxy diols having not more than 8 carbon atoms, polyols, and mixtures thereof; (iii) a third alcohol selected from (a) diols containing a charged group or atom, (b) diols containing an uncharged group or atom capable of charge formation and at least partially converting the uncharged group or atom into a charged group or atom, (c) polyols and further reaction of one or more hydroxyl group derived from the polyol with a compound containing a charged group or atom or a compound containing an uncharged group or atom capable of charge formation and at least partially converting said uncharged group or atom into a charged group or atom, and mixtures thereof. The invention further relates to charged polyurethane obtainable by the process, an aqueous dispersion thereof and the use thereof in a method of surface-treating a material in sheet or web form by applying the charged polyurethane to the surface of the material. |           |  |

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

|    |                          |    |  |    |  |    |                          |
|----|--------------------------|----|--|----|--|----|--------------------------|
| AL | Albania                  | ES | Spain                                    | LS | Lesotho                                      | SI | Slovenia                 |
| AM | Armenia                  | FI | Finland                                  | LT | Lithuania                                    | SK | Slovakia                 |
| AT | Austria                  | FR | France                                   | LU | Luxembourg                                   | SN | Senegal                  |
| AU | Australia                | GA | Gabon                                    | LV | Latvia                                       | SZ | Swaziland                |
| AZ | Azerbaijan               | GB | United Kingdom                           | MC | Monaco                                       | TD | Chad                     |
| BA | Bosnia and Herzegovina   | GE | Georgia                                  | MD | Republic of Moldova                          | TG | Togo                     |
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| BF | Burkina Faso             | GR | Greece                                   |    |  | TR | Turkey                   |
| BG | Bulgaria                 | HU | Hungary                                  | ML | Mali   | TT | Trinidad and Tobago      |
| BJ | Benin                    | IE | Ireland                                  | MN | Mongolia                                     | UA | Ukraine                  |
| BR | Brazil                   | IL | Israel                                   | MR | Mauritania                                   | UG | Uganda                   |
| BY | Belarus                  | IS | Iceland                                  | MW | Malawi                                       | US | United States of America |
| CA | Canada                   | IT | Italy                                    | MX | Mexico                                       | UZ | Uzbekistan               |
| CF | Central African Republic | JP | Japan                                    | NE | Niger  | VN | Viet Nam                 |
| CG | Congo                    | KE | Kenya                                    | NL | Netherlands                                  | YU | Yugoslavia               |
| CH | Switzerland              | KG | Kyrgyzstan                               | NO | Norway                                       | ZW | Zimbabwe                 |
| CI | Côte d'Ivoire            | KP | Democratic People's<br>Republic of Korea | NZ | New Zealand                                  |    |                          |
| CM | Cameroon                 |    | Republic of Korea                        | PL | Poland                                       |    |                          |
| CN | China                    | KR | Republic of Korea                        | PT | Portugal                                     |    |                          |
| CU | Cuba                     | KZ | Kazakhstan                               | RO | Romania                                      |    |                          |
| CZ | Czech Republic           | LC | Saint Lucia                              | RU | Russian Federation                           |    |                          |
| DE | Germany                  | LI | Liechtenstein                            | SD | Sudan  |    |                          |
| DK | Denmark                  | LK | Sri Lanka                                | SE | Sweden                                       |    |                          |

# INTERNATIONAL SEARCH REPORT

International Application No

PL/SE 99/01113

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 C08G18/08 C08G18/66 C08G18/80 D21H17/57

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 C08G D21H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document, with indication, where appropriate, of the relevant passages   | Relevant to claim No. |
|----------|--|-----------------------|
| Y        | EP 0 268 806 A (AKZO NV)<br>1 June 1988 (1988-06-01)<br>page 3, line 6 -page 3, line 36<br>example 3<br>claim 2<br>& US 4 777 224 A<br>--- | 1-15                  |
| Y        | WO 96 40811 A (FULLER H B LICENSING<br>FINANC) 19 December 1996 (1996-12-19)<br>page 4, line 31 -page 6, line 30<br>claims 1-3<br>---      | 1-15                  |
| Y        | US 4 096 127 A (SCHURMANN HORST ET AL)<br>20 June 1978 (1978-06-20)<br>cited in the application<br>claim 2; example 6<br>---               | 1-15                  |
|          | -/--   |                       |



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

### Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

15 October 1999

Date of mailing of the international search report

27/10/1999

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Authorized officer

Heidenhain, R

# INTERNATIONAL SEARCH REPORT

International Application No

PC./SE 99/01113

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document, with indication, where appropriate, of the relevant passages  | Relevant to claim No. |
|----------|---|-----------------------|
| A        | WO 96 38629 A (BAYER AG ; JANSSEN BERNHARD<br>(DE); KOENIG JOACHIM (DE); NOWAK PETER ( )<br>5 December 1996 (1996-12-05)<br>----- | 1-15                  |

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PC 1/SE 99/01113

| Patent document<br>cited in search report |   | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|---|---|---------------------|----------------------------|---------------------|
| EP 0268806                                | A | 01-06-1988          | DE 3640752 A               | 09-06-1988          |
|   |   |                     | FI 874434 A                | 29-05-1988          |
|   |   |                     | JP 63137918 A              | 09-06-1988          |
|   |   |                     | US 4777224 A               | 11-10-1988          |
| WO 9640811                                | A | 19-12-1996          | US 5610232 A               | 11-03-1997          |
|   |   |                     | US 5872182 A               | 16-02-1999          |
|   |   |                     | AU 695629 B                | 20-08-1998          |
|   |   |                     | AU 6102796 A               | 30-12-1996          |
|   |   |                     | CA 2219378 A               | 19-12-1996          |
|   |   |                     | EP 0830402 A               | 25-03-1998          |
|   |   |                     | JP 11507675 T              | 06-07-1999          |
|   |   |                     | NZ 310261 A                | 29-04-1999          |
|   |   |                     | AU 6101696 A               | 11-06-1997          |
|   |   |                     | CA 2233083 A               | 29-05-1997          |
|   |   |                     | EP 0847409 A               | 17-06-1998          |
|   |   |                     | WO 9719121 A               | 29-05-1997          |
| US 4096127                                | A | 20-06-1978          | DE 2457972 A               | 16-06-1976          |
|   |   |                     | AR 208936 A                | 15-03-1977          |
|   |   |                     | AT 356510 B                | 12-05-1980          |
|   |   |                     | AT 611077 A                | 15-09-1979          |
|   |   |                     | AT 343915 B                | 26-06-1978          |
|   |   |                     | AT 911175 A                | 15-10-1977          |
|   |   |                     | AU 8681075 A               | 26-05-1977          |
|   |   |                     | BE 836210 A                | 01-04-1976          |
|   |   |                     | BR 7508038 A               | 24-08-1976          |
|   |   |                     | CA 1068440 A               | 18-12-1979          |
|   |   |                     | CH 622535 A                | 15-04-1981          |
|   |   |                     | CS 198254 B                | 30-05-1980          |
|   |   |                     | DD 128378 A                | 16-11-1977          |
|   |   |                     | ES 442993 A                | 01-07-1977          |
|   |   |                     | FI 753272 A, B,            | 08-06-1976          |
|   |   |                     | FR 2293449 A               | 02-07-1976          |
|   |   |                     | GB 1516340 A               | 05-07-1978          |
|   |   |                     | IE 42099 B                 | 04-06-1980          |
|   |   |                     | IT 1052461 B               | 20-06-1981          |
|   |   |                     | JP 1048824 C               | 28-05-1981          |
|   |   |                     | JP 51088598 A              | 03-08-1976          |
|   |   |                     | JP 55041607 B              | 25-10-1980          |
|   |   |                     | NL 7514248 A, B,           | 09-06-1976          |
|   |   |                     | SE 425397 B                | 27-09-1982          |
|   |   |                     | SE 7513727 A               | 08-06-1976          |
|   |   |                     | YU 308275 A                | 27-04-1983          |
|   |   |                     | ZA 7507197 A               | 27-10-1976          |
| WO 9638629                                | A | 05-12-1996          | DE 19520092 A              | 05-12-1996          |
|   |   |                     | AU 698702 B                | 05-11-1998          |
|   |   |                     | AU 5998796 A               | 18-12-1996          |
|   |   |                     | CA 2222731 A               | 05-12-1996          |
|   |   |                     | DE 59602726 D              | 16-09-1999          |
|   |   |                     | EP 0828890 A               | 18-03-1998          |
|   |   |                     | JP 11505899 T              | 25-05-1999          |
|   |   |                     | ZA 9604471 A               | 11-12-1996          |



15  
Claims

1. A process for the production of charged polyurethanes comprising reacting isocyanate groups of a polyisocyanate with hydroxyl groups of different alcohols comprising  
(i) a first alcohol selected from one or more diols containing at least 10 carbon atoms;  
5 (ii) a second alcohol selected from alkylene diols having not more than 8 carbon atoms, alkyleneoxy diols having not more than 8 carbon atoms, polyols, and mixtures thereof;  
(iii) a third alcohol selected from (a) diols containing a charged group or atom, (b) diols containing an uncharged group or atom capable of charge formation and at least partially converting the uncharged group or atom into a charged group or atom, (c) polyols and  
10 further reaction of one or more hydroxyl group derived from the polyol with a compound containing a charged group or atom or a compound containing an uncharged group or atom capable of charge formation and at least partially converting said uncharged group or atom into a charged group or atom, and mixtures thereof.
2. A process for the production of charged polyurethanes according to claim 1,  
15 characterised in that in the production of anionic polyurethanes, the first alcohol is an aliphatic diol having an aliphatic side-chain substituent having at least 10 carbon atoms.
3. A process for the production of charged polyurethanes according to claim 1 or 2, characterised in that the polyurethane is anionic.
- 20 4. A process for the production of charged polyurethanes according to claim 1, characterised in that the polyurethane is cationic.
5. A process for the production of charged polyurethanes according to claim 1, characterised in that the polyurethane is amphoteric.
6. A process according to any of the preceding claims, characterised in  
25 that the third alcohol is selected from (a) diols containing a charged group or atom, (b) diols containing an uncharged group or atom capable of charge formation, and mixtures thereof.
7. A process according to any of the preceding claims, characterised in that the first and second alcohols are introduced into the process for reaction before  
30 introducing the third alcohol.
8. A process according to any of the preceding claims, characterised in that (i) the first alcohol is an aliphatic diol having an aliphatic substituent with at least 10 carbon atoms; (ii) the second alcohol is selected from diols, triols, tetraols, and mixtures thereof; and (ii) the third alcohol is selected from N-alkandiol dialkylamines, acid addition  
35 salts thereof and quaternization products thereof, N-alkyl dialkanolamines, acid addition salts thereof and quaternization products thereof, diols containing a carboxylic acid

group, diols containing a carboxylate group, diols containing a sulfonic acid group, diols containing a sulfonate group, and mixtures thereof.

9. A process according to any of the preceding claims, characterised in that the process is carried out using from 10 to 60 mole% of (I) hydroxyl groups of the first alcohol, from 3 to 50 mole% of (II) hydroxyl groups of the second alcohol and from 25 to 60 mole% of (III) hydroxyl groups of the third alcohol, the sum of percentages of (I) + (II) + (III) being 100.

10. Charged polyurethane obtainable by a process according to any one of claims 1 to 9.

10 11. Aqueous dispersion containing a charged polyurethane according to claim 10 or containing a charged polyurethane produced according to any of claims 1 to 9.

12. A method of surface-treating a material in sheet or web form by applying a composition to the surface of the material, characterised in that the composition comprises a charged polyurethane according to claim 10 or an aqueous dispersion  
15 containing a charged polyurethane according to claim 11.

13. A method according to claim 12, characterised in that the material in sheet or web form is a cellulosic product.

14. A method according to claim 12 or 13, characterised in that it is a surface sizing method which is carried out using an aqueous sizing composition.

20 15. A method according to claim 12 or 13, characterised in that it is a tinting method which is carried out using an aqueous pigmented composition.

# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

15  
REC'D 21 SEP 2000

WIPO PCT

|  |   |   |
|--|---|---|
| Applicant's or agent's file reference<br><b>Case 0145</b>  | <b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) |   |
| International application No.<br><b>PCT/SE99/01113</b>   | International filing date (day/month/year)<br><b>18/06/1999</b>   | Priority date (day/month/year)<br><b>24/06/1998</b> |
| International Patent Classification (IPC) or national classification and IPC<br><b>C08G18/08</b> |   |   |
| Applicant<br><b>AKZO NOBEL N.V. et al.</b>   |   |   |

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 4 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

|   |   |
|---|---|
| Date of submission of the demand<br><b>17/01/2000</b>   | Date of completion of this report<br><b>19.09.00</b>  |
| Name and mailing address of the international preliminary examining authority:<br> <b>European Patent Office<br/>D-80298 Munich<br/>Tel. 49 89 2369-0 Telex 523656 eomud</b> | Authorized officer<br><b>Heidenhain, R</b><br> |

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/SE99/01113

**I. Basis of the report**

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

**Description, pages:**

1-13 as originally filed

**Claims, No.:**

1-16 as received on 24/06/2000 with letter of 15/06/2000

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:  
☐ the claims, Nos.:  
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N) Yes: Claims 1-16  
No: Claims

Inventive step (IS) Yes: Claims 1-16  
No: Claims

Industrial applicability (IA) Yes: Claims 1-16

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/SE99/01113

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**2. Citations and explanations**

**see separate sheet**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/SE99/01113

**Re Item V**

**Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

Novelty: Claims are novel over D1 in that the second alcohol ii) has been restricted to diols having not more than 8C-atoms or polyols with at least three hydroxyl groups. In D1 the second polyol is a polyoxyalkylene diol of molecular weight about 2000 (Article 33, 2 PCT).

Inventive step: D1 (or its American equivalent US4777224, which is cited in the application) is considered to be closest prior art. It differs over the application in the component ii), see above under novelty.

Object of the application is to provide paper sizing agents based on charged polyurethanes with improved sizing, stability and application properties.

From table 1 in the application, the polyurethane dispersions of the examples according to the invention showed significant improved sizing efficiency over the dispersion of the comparative example 10, where a charged polyurethane was prepared according to the teachings of D1 adding a polyethylene glycol of average molecular weight 2000. This is regarded as indicative of the solution of the technical problem by the distinguishing feature over the closest prior art. The solution is not obvious in view of any other known prior art. Therefore an inventive step is acknowledged (Article 33,3 PCT).

Industrial applicability: no objection.